NOCTURN U3 Color
Engineering User Guide

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Document Revisions

Date	Version Number	Document Changes
June 10, 2014	A-1	Initial Draft
Oct. 14, 2014	A-2	Updated register list and QE curve

Table of Contents

SAFETY SUMMARY

WARNING and CAUTION statements have been strategically placed throughout the text prior to operating or maintenance procedures, practices, or conditions considered essential to the protection of personnel (WARNING) or equipment and property (CAUTION). NOTES emphasize necessary and important data. CAUTIONS and NOTES appear in the text as applicable. Definitions for WARNINGS, CAUTIONS and NOTES are as follows:

WARNING

A warning indicates an operation, condition, or statement, etc., which, if not strictly observed, could result in injury to or death of personnel.

CAUTION

A caution indicates an operation, maintenance procedure, or condition, etc., which, if not strictly observed, could result in damage to, or destruction of, equipment or loss of hardware performance or function.

NOTE

A note indicates an essential operating or maintenance procedure, condition or statement or explanatory text.

1 Introduction

1.1 Scope and Purpose

The NOCTURN U3 COLOR (see Figure 1) is a rugged low light camera module that features high-definition resolution, high sensitivity and high dynamic range. Powered by PHOTONIS' 1 inch optical format 1280×1024 pixel (SXGA) LYNX color CMOS sensor, the NOCTURN provides real-time imaging capabilities (from daylight to one quarter moon scene illumination) in the visible and near infrared spectrum. Its configuration with USB 3 Vision compatible interface makes this camera module ideal for integration into scientific and general machine vision applications.

With its 9.7µm×9.7µm pixel pitch and 5e- median read noise, the NOCTURN provides unsurpassed signal to noise at low light with video rates up to 60 frames per second. Leveraging PHOTONIS expertise in night vision imaging, the NOCTURN electronics incorporates a multitude of functions to enhance the low light level performance. This camera features Automatic Gain Control (AGC), Automatic Exposure Control (AEC), Non-Uniformity Correction (NUC) and advanced image enhancement, allowing the NOCTURN to provide continuous situational awareness without compromising mobility and SWaP. The "GV" version of the NOCTURN has a GEV compatible 10-bit/8-bit (user configurable) digital video output.

Figure 1 Front View of the NOCTURN U3 Camera

This user guide provides an overview of the functionality, operation and communication interface with the camera. The hardware interface for the camera are only briefly discussed in this guide, the user should refer to the NOCTURN U3 Electro-Mechanical ICD for a detailed description of the hardware interface. Please contact PHOTONIS USA technical support for details that are not covered in this guide.

1.2 Product Configuration

The "U3" model indicates that the NOCTURN camera has an integrated interface board that can be used to output digital video over a USB 3 Vision compatible interface. The back panel of this NOCTURN configuration is shown in Figure 2.

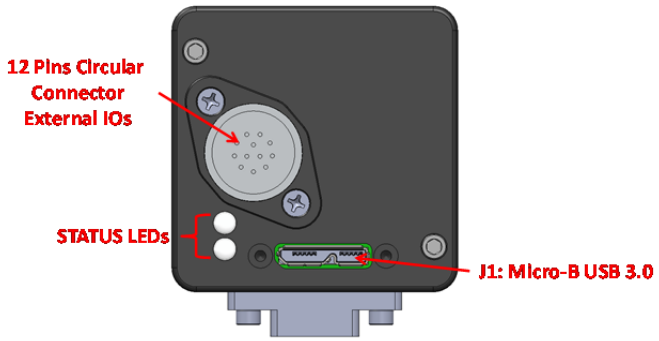


Figure 2 Back View of the NOCTURN GV Camera

The NOCTURN U3 can only be powered via USB 3 connector interface (see Table 1 for power input specification). The NOCTURN U3 Electro-Mechanical ICD provides both the pin-out and mating connector part this connector.

Table 1 NOCTURN XL Input Power Specifications

Parameter	Description	Min	Typ	Max	Units
Vin	Input Voltage	--	5	--	V
Icc	Input Current	--	700	--	mA

1.2.1.1 USB 3 Concept

The NOCTURN U3 camera interface is compliant with the USB 3 Vision standard version 1.0. This standard is widely used by camera manufacturers and imaging software suppliers and relies on the USB 3.0 interface that is standard on most PC and can provide high bandwidth in excess of 350 MB/s. Please refer to the AIA website for further details and actual USB3 Vision specifications

1.2.1.2 GenICam

The NOCTURN GV interface is compliant with the "Generic Interface for Cameras" or GenICam standard version 2.0. Please refer to European Machine Vision Association website for further details and actual GenICam standard definition.

1.3 Product Specifications

Detailed specifications for the NOCTURN U3 Color camera are given in Table 2.

Table 2 NOCTURN U3 Color Specifications

Parameter	Specification
Sensor Resolution	1280 × 1024 Pixels
Sensor Pixel Pitch	9.7 µm × 9.7 µm

Parameter	Specification
Sensor Well Capacity	> 25000 e-
Sensor Dynamic Range	> 60 dB
Sensor Read Noise	< 5 e- med. (60fps Mode)
Sensor Quantum Efficiency	> 60% at 600nm
Frame Rate	60 Hz
Sensor Image Lag	< 0.1 %
Sensor Shutter Mode	Rolling
Lens Mount	CS
Dimensions (W × H × D)	41 mm × 41 mm × 58 mm
Weight	< 150 grams
Digital Video Output	Monochrome 8 / 10 bit, Color 24 bit YCbCr or YUV (4:2:2 format) over USB 3
Communication	Serial via External interface or USB
Image Correction	Bad pixel replacement and 2 points non uniformity correction
Contrast Enhancement	Contrast stretching, equalization and adaptive equalization
Gain Control	Automatic gain and exposure control or manual
Digital Zoom	Up to 8X (0.001 increment resolution)
Synchronization	Frame start trigger (2 to 12V or over USB 3 serial interface) Analog output strobe reference (2 to 12V or over USB 3 serial interface)
OSD	Full on screen display capability with text, standard geometrical shape and graphics
Camera/Imaging Start Up Time	< 10 seconds

Parameter	Specification
Operating Temperature	0° to +50° C
Storage Temperature	-50° to +80° C
Input Voltage	USB powered
Power (Typical)	3.5 W (typical)

1.4 Quantum Efficiency

The typical quantum efficiency as a function of wavelength for the LYNX CMOS for versions with and without micro-lenses is shown in *Figure 3*.

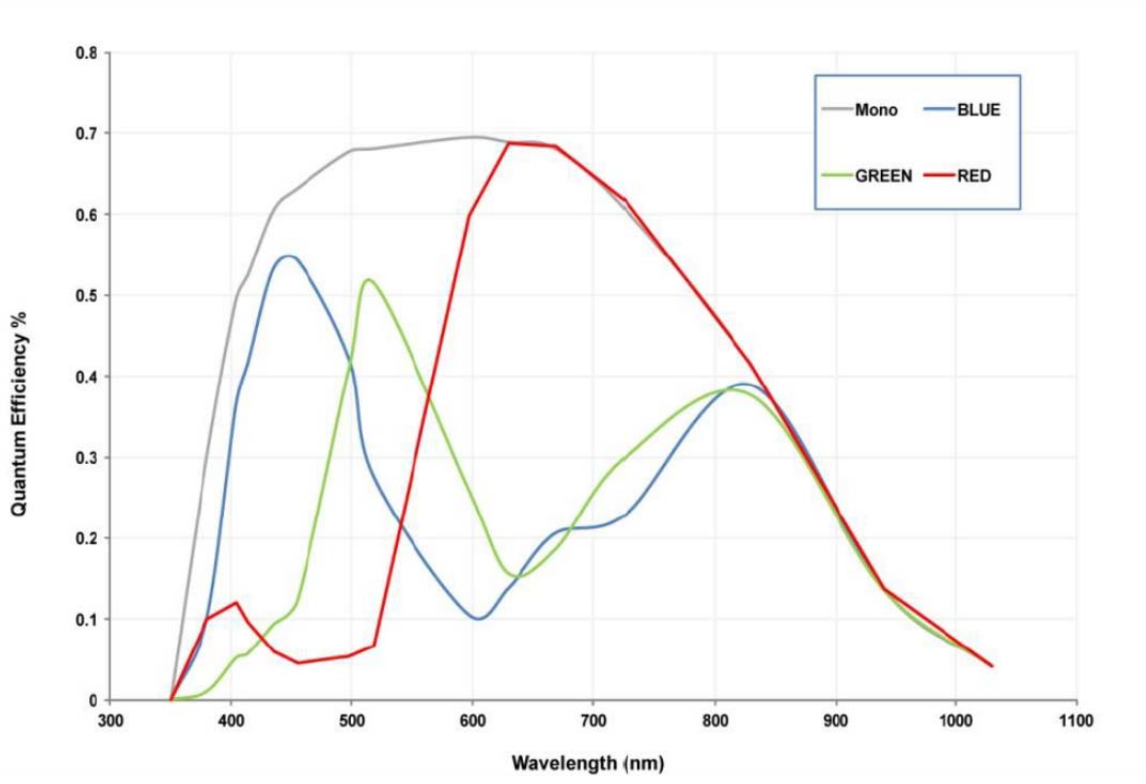


Figure 3 LYNX Color CMOS Quantum Efficiency Curve

2 Getting Started with the Camera

This section provides some key information on:

- How to unpack the camera

- How to install the required software
- Install the required hardware
- How to acquire images and change camera settings.

WARNING

The NOCTURN U3 Color cameras contain electrostatic sensitive parts and assemblies and should be handled within protected areas and in accordance with industry standard electrostatic discharge (ESD) protective handling procedures. Under no circumstances, should the camera be disassembled unless directed to do so by PHOTONIS personnel. Disassembly of the camera and damage to the anti-tamper sticker on the side of the camera will void the warranty.

2.1 Unpacking Instructions

a) Inspect shipping container and notify PHOTONIS personnel of any damage that may have occurred during shipping.
b) Record the camera serial number located on the side of the shipping container for your records. This number is also engraved on the bottom of the camera. You will need that number to be able to receive technical support with your product.
c) Open shipping container and remove camera and USB memory stick that contains the camera SDK and evaluation software.
d) Inspect camera module for proper configuration and potential shipping damage. Immediately report any problem to PHOTONIS personnel.

2.2 Hardware installation

This section describes the hardware installation and requirements to operate the NOCTURN U3. The documentation for the camera as well as the SDK is provided on the USB flash drive located in the camera shipping container.

WARNING

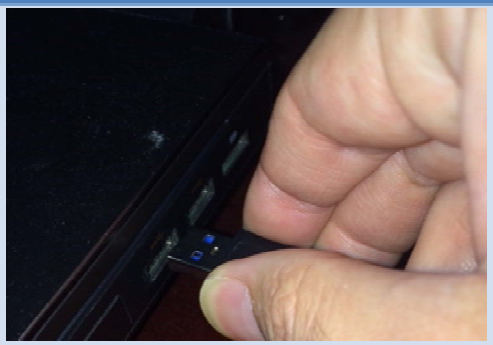
Before connecting the NOCTURN U3 camera to a PC, the software and USB driver must be installed.

The following hardware is required:

- PC with Microsoft Windows 7 (64 bit operating system is recommended) and at least one USB 3.0 super speed port
- NOCTURN U3 color camera
- A USB 3.0 A to micro-USB B cable.

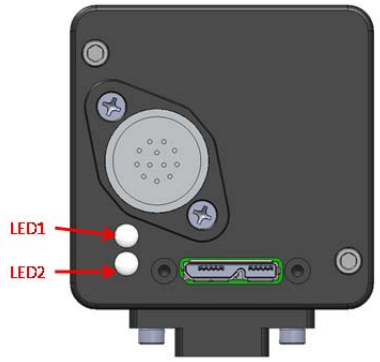
The hardware installation steps are provided in Table 3.

Table 3 Hardware Installation Steps

Description	Image
Connect the camera to the USB 3.0 interface of your PC using a USB 3.0 A to micro-USB B adapter cable (please refer to section 2.3 to install the support software and driver prior to connecting the camera to the PC).	
Upon connecting the camera for the first time, windows will install the proper driver assuming that the software and driver have been properly installed.	
Status LED should turn green within 10 seconds after power has been applied to indicate that the camera is operating normally.	

NOTE

The back panel of the NOCTURN U3 has two different status LEDs.



LED1: -Green → camera is receiving power and the embedded processor main load is being used

-Orange →camera is receiving power but the embedded processor backup load is being used

LED2: -Green →indicates a super speed USB 3.0 connection

-Yellow flashes →indicate that everything is operating properly between the camera interface and the host.

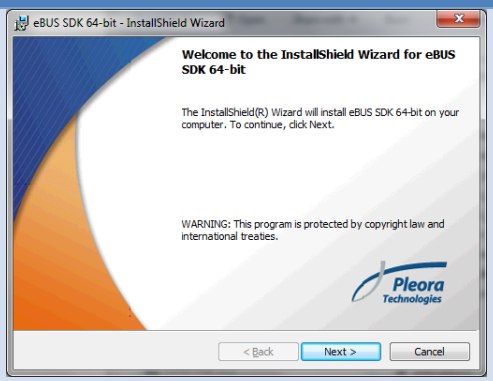
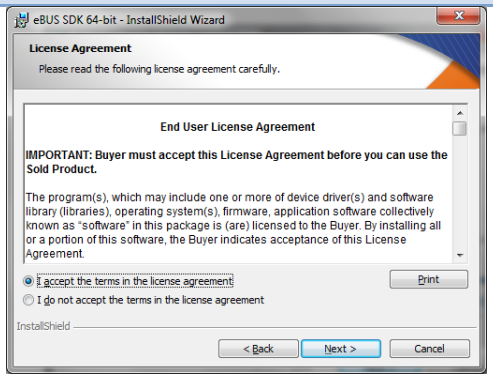
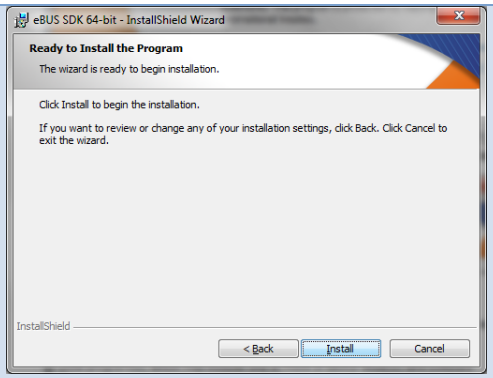
2.3 Software Installation

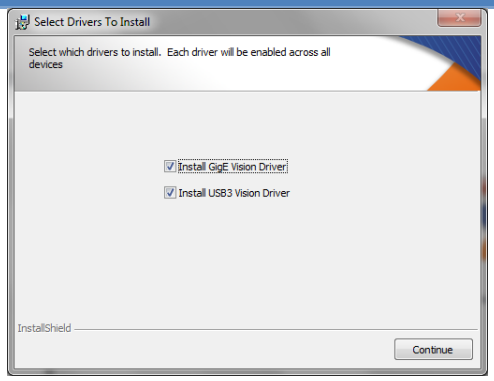
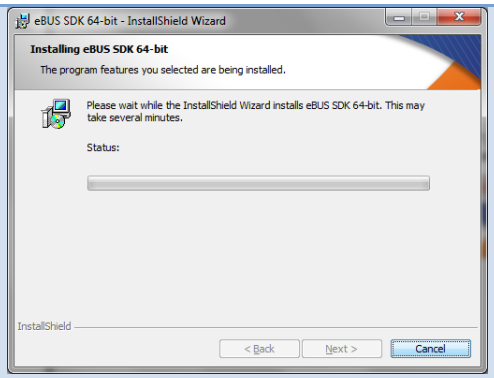
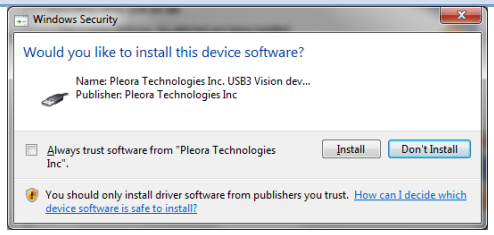
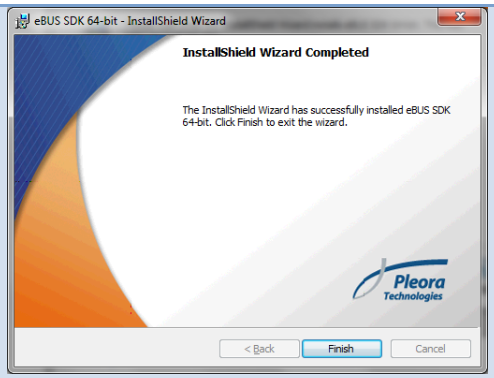
CAUTION

If not using the provided eBUS player, a USB3 Vision compliant software is required to operate the camera and capture imagery from the camera.

This section describes the tasks to the install the Pleora SDK and eBUS player (please contact technical support to receive a download link). Before proceeding please make sure that the latest drivers for USB 3.0 adapter are installed.

Table 4 Pleora eBUS SDK Installation

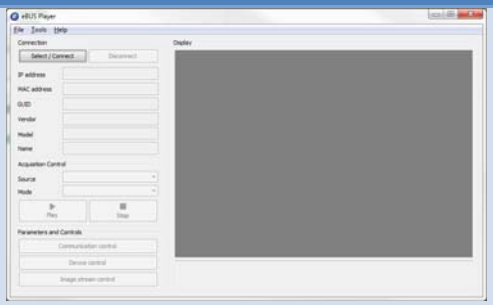
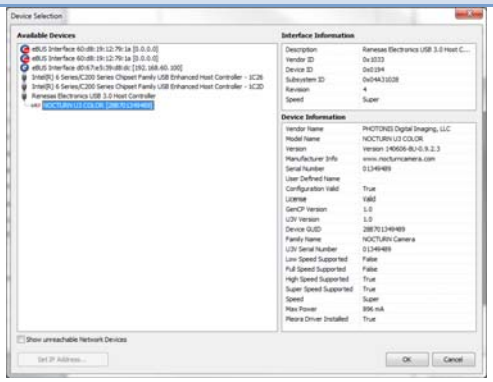
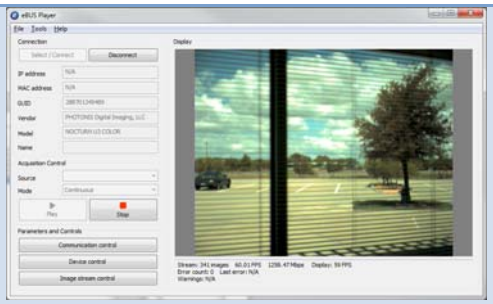
Description	Image
Start by double clicking on the SDK executable to start the installation. **Click "Next" on the welcome splash screen to start the installation process.**	
Go through the License agreement, select "I accept the terms in the license agreement" if you agree with the terms and click the "Next" to go to the next screen.	
Click the "Install" button to start the installation.	

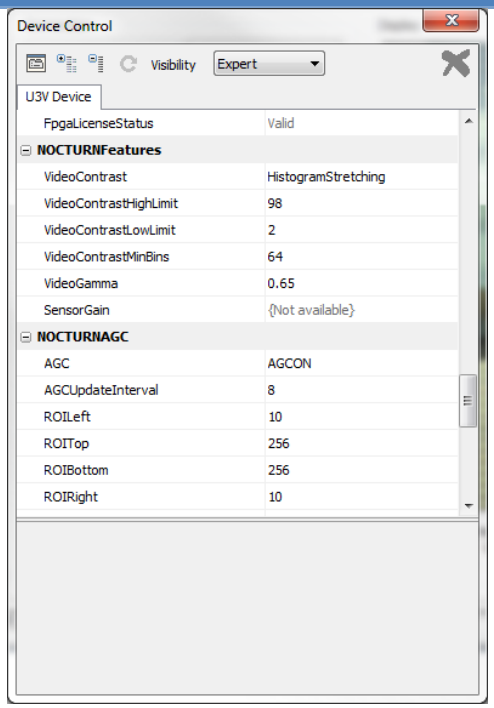
Description	Image
Select the driver to install for the camera (at a minimum we recommend to install the GigE Vision driver).	
Wait for the installer to complete the installation process.	
When prompted to install the device software for the "Pleora Technologies Inc. USB3 Vision Device" click the "Install" button if you plan to use the NOCTURN U3 in addition to the NOCTURN GV.	
Click the "Finish" button to complete the installation and exit the installer.	

2.4 Getting Started

This section describes how to start acquiring images using the eBUS player installed in the previous section.

Table 5 Getting Started

Description	Image
Make sure the camera is connected and powered on. **Start the eBUS player software and click on the "Select/Connect" button.**	
Select the NOCTURN U3 from the Available Devices and press "OK".	
Finish the setup connection process. A "Play" button should now be available to start acquiring images from the camera.	

Description	Image
Camera parameters can be modified through the eBUS player by selecting the "Device control" button (see following section for further details).	

3 Camera Commands

The camera operation can be adjusted through the "Device Control" interface of the eBUS player. The visibility of these controls can be altered by changing the visibility box between "Beginner", "Expert" and "Guru" depending on the expertise of the user. Furthermore these settings are organized in major sections:

- DeviceControl
- ImageFormatControl
- AcquisitionControl
- EventControl
- TransportLayer Control
- UserSetControl
- PixelBusInterfaceControl
- NOCTURNFeatures
- NOCTURNAGC
- NOCTURNFilters
- NOCTURNAdvancedFeatures
- NOCTURNColor

The following section describes the available commands in details.

3.1 DeviceControl

All the values for the DeviceControl settings are fixed at the factory.

3.1.1 DeviceScanType

Description: scan type of the sensor of the device.

- Register: DeviceScanType (0x11030)
- Field: DeviceScanType
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: Areascan

Possible Values:

- Enum value: Areascan (0x0)
    - GenICam node name: Areascan

3.1.2 DeviceVendorName

Description: name of the manufacturer of the device.

- Register: DeviceVendorName (0x0004)
- Field: DeviceVendorName
- Type: String
- Length: 64
- Access: RO
- Disabled: False
- Default: PHOTONIS Digital Imaging, LLC

3.1.3 DeviceModelName

Description: model of the device.

- Register: DeviceModelName (0x0044)
- Field: DeviceModelName
- Type: String
- Length: 64
- Access: RO
- Disabled: False
- Default: NOCTURN U3 COLOR

3.1.4 DeviceFamilyName

Description: identifier of the product family of the device.

- Register: DeviceFamilyName (0x0084)
- Field: DeviceFamilyName
- Type: String
- Length: 64
- Access: RO
- Disabled: False
- Default: NOCTURN CAMERA

3.1.5 DeviceManufacturerInfo

Description: manufacturer information about the device.

- Register: DeviceManufacturerInfo (0x0104)
- Library: sfnc_usb3
- Field: DeviceManufacturerInfo
- Type: String
- Length: 64
- Access: RO
- Disabled: False
- Default: www.nocturncamera.com

3.1.6 DeviceVersion

Description: version of the device.

- Register: DeviceVersion (0x00C4)
- Field: DeviceVersion
- Type: String
- Length: 64
- Access: RO
- Disabled: False
- Default: <undefined>

3.1.7 DeviceFirmwareVersion

Description: version of the firmware of the device.

- Register: DeviceFirmwareVersion (0x11040)
- Field: DeviceFirmwareVersion
- Type: String
- Length: 64
- Access: RO
- Disabled: False
- Default: 0

3.1.8 DeviceSerialNumber

Description: device serial number. This string is a unique identifier of the device.

- Register: DeviceSerialNumber (0x0144)
- Library: sfnc_usb3
- Field: DeviceSerialNumber
- Type: String
- Length: 64
- Access: RO
- Disabled: False
- Default: <undefined>

3.1.9 DeviceUserID

Description: user programmable device identifier.

- Register: DeviceUserID (0x0184)
- Field: DeviceUserID
- Type: String
- Length: 64
- Access: RW
- Disabled: False
- Default: <undefined>

3.1.10 DeviceManifestEntrySelector

Description: selects the manifest entry to reference.

- Register: DeviceManifestEntrySelector (0x0000)
- Field: DeviceManifestEntrySelector
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.1.11 DeviceManifestXMLMajorVersion

Description: indicates the major version number of the GenICam XML file of the selected manifest entry.

- Register: DeviceManifestXMLMajorVersion (0x0000)
- Field: DeviceManifestXMLMajorVersion
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: 0

3.1.12 DeviceManifestXMLMinorVersion

Description: indicates the minor version number of the GenICam XML file of the selected manifest entry.

- Register: DeviceManifestXMLMinorVersion (0x0000)
- Field: DeviceManifestXMLMinorVersion
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: 0

3.1.13 DeviceManifestXMLSubMinorVersion

Description: indicates the subminor version number of the GenICam XML file of the selected manifest entry.

- Register: DeviceManifestXMLSubMinorVersion (0x0000)
- Field: DeviceManifestXMLSubMinorVersion
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: 0

3.1.14 DeviceManifestSchemaMajorVersion

Description: indicates the major version number of the schema file of the selected manifest entry.

- Register: DeviceManifestSchemaMajorVersion (0x0000)
- Field: DeviceManifestSchemaMajorVersion[
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: 0

3.1.15 DeviceManifestSchemaMinorVersion

Description: indicates the minor version number of the schema file of the selected manifest entry.

- Register: DeviceManifestSchemaMinorVersion (0x0000)
- Field: DeviceManifestSchemaMinorVersion
- Type: Integer
- LSB: 0
- MSB: 31

- Access: RO
- Disabled: False
- Default: 0

3.1.16 DeviceGenCpVersionMajor

Description: major version of the GenCP protocol supported by the device.

- Register: DeviceGenCpVersion (0x0000)
- Field: DeviceGenCPVersionMajor
- Type: Integer
- LSB: 16
- MSB: 31
- Access: RO
- Disabled: False
- Default: 1

3.1.17 DeviceGenCpVersionMinor

Description: minor version of the GenCP protocol supported by the device.

- Register: DeviceGenCpVersion (0x0000)
- Field: DeviceGenCPVersionMinor
- Type: Integer
- LSB: 0
- MSB: 15
- Access: RO
- Disabled: False
- Default: 0

3.1.18 DeviceLinkSelector

Description: selects which Link of the device to control.

- Register: DeviceLinkSelector (0x0000)
- Field: DeviceLinkSelector
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.1.19 DeviceLinkThroughputLimitMode

Description: controls if the DeviceLinkThroughputLimit is active. When disabled, lower level TL specific features are expected to control the throughput. When enabled, DeviceLinkThroughputLimit controls the overall throughput.

- Register: DeviceLinkThroughputLimitMode (0x11084)
- Field: DeviceLinkThroughputLimitMode
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

Possible Values:

- Enum value: On (0x0)
  - GenICam node name: On
- Enum value: Off (0x1)
  - GenICam node name: Off

3.1.20 DeviceLinkThroughputLimit

Description: limits the maximum bandwidth in bytes per second (Bps) of the data that will be streamed out by the device on the selected Link. If necessary, delays will be uniformly inserted between transport layer packets in order to control the peak bandwidth.

- Register: DeviceLinkThroughputLimit (0x11080)
- Field: DeviceLinkThroughputLimit
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.1.21 DeviceStreamChannelCount

Description: indicates the number of streaming channels supported by the device.

- Register: DeviceStreamChannelCount (0x1001001C)
- Field: DeviceStreamChannelCount
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: 0

3.1.22 DeviceStreamChannelType

Description: reports the direction of the stream channel.

- Register: DeviceStreamChannelType (0x0000)
- Field: DeviceStreamChannelType
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: Transmitter

Possible Values:

- Enum value: Transmitter (0x0)
    - GenICam node name: Transmitter

3.1.23 DeviceMessageChannelCount

Description: indicates the number of message channels supported by the specified Link of the device.

- Register: DeviceMessageChannelCount (0x0000)
- Field: DeviceMessageChannelCount
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: 1

3.1.24 DeviceCharacterSet

Description: character set used by the strings of the device bootstrap register.

- Register: DeviceCapability (0x01C4)
- Field: DeviceCharacterSet
- Type: Enum
- LSB: 4
- MSB: 7
- Access: RO
- Disabled: False
- Default: ASCII

Possible Values:

- Enum value: ASCII (0x0)
    - GenICam node name: ASCII
- Enum value: UTF8 (0x1)

    - GenICam node name: UTF8
- Enum value: UTF16 (0x2)
    - GenICam node name: UTF16

3.1.25 DeviceRegistersStreamingStart

Description: prepare the device for registers streaming without checking for consistency.

- Register: DeviceRegistersStreamingStart (0x11004)
- Field: DeviceRegistersStreamingStart
- Type: Command
- LSB: 0
- MSB: 31
- Access: WO
- Disabled: False
- Default: 1

3.1.26 DeviceRegistersStreamingEnd

Description: announce the end of registers streaming. This will do a register set validation for consistency and activate it. This will also update the DeviceRegistersValid flag.

- Register: DeviceRegistersStreamingEnd (0x11008)
- Field: DeviceRegistersStreamingEnd
- Type: Command
- LSB: 0
- MSB: 31
- Access: WO
- Disabled: False
- Default: 1

3.1.27 Timestamp

Description: reports the current value of the device timestamp counter.

- Register: Timestamp (0x01F0)
- Field: Timestamp
- Type: Integer
- LSB: 0
- MSB: 63
- Access: RO
- Disabled: False
- Default: 0

3.1.28 TimestampLatch

Description: latches the current device time into the timestamp register.

- Register: TimestampLatch (0xFFFFFFFE)

- Field: TimestampLatch
- Type: Command
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.1.29 TimestampIncrement

Description: reports the timestamp increment in ns per tick.

- Register: TimestampIncrement (0xFFFFFFFE)
- Field: TimestampIncrement
- Type: Integer
- LSB: 32
- MSB: 63
- Access: RW
- Disabled: False
- Default: 0

3.2 ImageFormatControl

3.2.1 SensorDigitizationTaps

Description: number of digitized samples outputted simultaneously by the camera A/D conversion stage.

- Register: SensorDigitizationTaps (0x12650)
- Field: SensorDigitizationTaps
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

Possible Values:

- Enum value: One (0x0)
    - GenICam node name: One

3.2.2 WidthMax

Description: maximum width of the image (in pixels). The dimension is calculated after horizontal binning, decimation or any other function changing the horizontal dimension of the image.

- Register: WidthMax (0x0000)
- Field: WidthMax
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: 1280

3.2.3 HeigthMax

Description: maximum height of the image (in pixels). This dimension is calculated after vertical binning, decimation or any other function changing the vertical dimension of the image HeightMax does not take into account the current Region of interest (Height or OffsetY). Its value must be greater than 0 and less than or equal to SensorHeight (unless an oversampling feature is present).

- Register: HeightMax (0x0000)
- Field: HeightMax
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: 1025

3.2.4 Width

Description: Width of the image provided by the device (in pixels).

- Register: Width (0x12500)
- Field: Width
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 1280

3.2.5 Heigth

Description: height of the image provided by the device (in pixels).

- Register: Height (0x12510)
- Field: Height

- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 1024

3.2.6 OffsetX

Description: horizontal offset from the origin to the region of interest (in pixels).

- Register: OffsetX (0x12520)
- Field: OffsetX
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.2.7 OffsetY

Description: vertical offset from the origin to the region of interest (in pixels).

- Register: OffsetY (0x12530)
- Field: OffsetY
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 1

3.2.8 PixelFormat

Description: format of the pixels provided by the device. It represents all the information provided by PixelCoding, PixelSize, PixelColorFilter combined in a single feature.

- Register: PixelFormat (0x12540)
- Field: PixelFormat
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW[1]
- Disabled: False

[1] Switching PixelFormat is done using the NOCTURN OutputMode command

- Default: YCbCr422_8_CbYCrY

Possible Values:

- Enum value: Mono8 (0x1080001)
  - GenICam node name: Mono8
- Enum value: Mono10 (0x1100003)
  - GenICam node name: Mono10
- Enum value: YUV422_8_UYVY (0x210001F)
  - GenICam node name: YUV422_8_UYVY
- Enum value: YCbCr422_8_CbYCrY (0x2100043)
  - GenICam node name: YCbCr422_8_CbYCrY

3.2.9 PixelSize

Description: total size in bits of a pixel of the image.

- Register: PixelSize (0x0000)
- Field: PixelSize
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 7

Possible Values:

- Enum value: Bpp8 (0x3)
  - GenICam node name: Bpp8
- Enum value: Bpp16 (0x7)
  - GenICam node name: Bpp16

3.2.10 PixelColorFilter

Description: type of color filter that is applied to the image.

- Register: PixelColorFilter (0x0000)
- Field: PixelColorFilter
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

Possible Values:

- Enum value: None (0x0)
    - GenICam node name: None

3.2.11 TestPattern

Description: selects the type of test pattern that is generated by the device as image source.

- Register: TestPattern (0x12550)
- Field: TestPattern
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: Off

Possible Values:

- Enum value: Off (0x0)
    - GenICam node name: Off
- Enum value: IPEngineTestPattern (0x80000000)
    - GenICam node name: IPEngineTestPattern

3.3 AcquisitionControl

3.3.1 AcquisitionMode

Description: sets the acquisition mode of the device. It defines mainly the number of frames to capture during an acquisition and the way acquisition stops.

- Register: AcquisitionMode (0x13100)
- Field: AcquisitionMode
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: Continuous

Possible Values:

- Enum value: Continuous (0x0)
    - GenICam node name: Continuous

- Enum value: SingleFrame (0x1)
    - GenICam node name: SingleFrame

- Enum value: MultiFrame (0x2)
    - GenICam node name: MultiFrame

3.3.2 AcquisitionStart

Description: starts an acquisition.

- Register: AcquisitionStart (0x13110)
- Field: AcquisitionStart
- Type: Command
- LSB: 0
- MSB: 31
- Access: WO
- Disabled: False
- Default: 1

3.3.3 AcquisitionStop

Description: stops an acquisition.

- Register: AcquisitionStop (0x13120)
- Field: AcquisitionStop
- Type: Command
- LSB: 0
- MSB: 31
- Access: WO
- Disabled: False
- Default: 1

3.3.4 AcquisitionFrameCount

Description: number of frames to acquire in MultiFrame Acquisition mode.

- Register: AcquisitionFrameCount (0x20013438)
- Field: AcquisitionFrameCount
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 1

3.3.5 AcquisitionFrameToSkip

Description: controls the number of frame to skip between successively acquired frames.

- Register: AcquisitionFrameToSkip (0xFFFFFFFE)

- Field: AcquisitionFrameToSkip
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.3.6 ExposureTime

Description: sensor exposure time in ms. Control is only available if the NOCTURN automatic gain and exposure is disabled.

- Register: ExposureTime (0x13020)
- Field: ExposureTime
- Type: Float
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: True
- Default: 0

Possible Values: 0.0156 to 1000ms

3.4 EventControl

3.4.1 U3vTriggerEventTest

Description: triggers an EventTest event.

- Register: U3vTriggerEventTest (0x10030008)
- Field: U3vTriggerEventTest
- Type: Command
- LSB: 0
- MSB: 0
- Access: RW
- Disabled: False
- Default: 1

3.4.2 U3vEventTest

Description: returns the unique identifier of the U3vEventTest event.

- Register: U3vEventTest (0xFFFFFFFE)
- Field: U3vEventTest
- Type: Integer

- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 20479

3.4.3 U3vEventTestTimestamp

Description: returns the timestamp of the U3vEventTest event.

- Register: U3vEventTestTimestamp (0xFFFFFFFE)
- Library: adv_features_g2
- Field: U3vEventTestTimestamp
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.5 TransportLayerControl

3.5.1 TransportLayerControl

3.5.1.1 U3vVersionMajor

Description: major version of the specification.

- Register: U3VVersion (0x10010000)
- Field: USB3VisionVersionMajor
- Type: Integer
- LSB: 16
- MSB: 31
- Access: RO
- Disabled: False
- Default: 1

3.5.1.2 U3vVersionMinor

Description: minor version of the specification.

- Register: U3VVersion (0x10010000)
- Field: USB3VisionVersionMinor
- Type: Integer
- LSB: 0
- MSB: 15
- Access: RO

- Disabled: False
- Default: 0

3.5.1.3 U3vCurrentSpeed

Description: reports the current speed of the device.

- Register: U3vCurrentSpeed (0xFFFFFFFE)
- Field: U3vCurrentSpeed
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: LowSpeed

Possible Values:

- Enum value: LowSpeed (0x1)
  - GenICam node name: LowSpeed
- Enum value: FullSpeed (0x2)
  - GenICam node name: FullSpeed
- Enum value: HighSpeed (0x4)
  - GenICam node name: HighSpeed
- Enum value: SuperSpeed (0x8)
  - GenICam node name: SuperSpeed

3.5.1.4 TestPendingAck

Description: when set, the device waits a time period of TestPendingAck ms before acknowledging; otherwise, the device reports the current value without any wait time.

- Register: TestPendingAck (0x19004)
- Field: TestPendingAck
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 1

3.5.1.5 U3vSupportedOptionSelector

Description: selects the U3V option to interrogate for existing support.

- Register: U3vSupportedOptionSelector (0xFFFFFFFE)
- Field: U3vSupportedOptionSelector

- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: UserDefinedName

Possible Values:

- Enum value: UserDefinedName (0x0)
  - GenICam node name: UserDefinedName
- Enum value: AccessPrivilege (0x1)
  - GenICam node name: AccessPrivilege
- Enum value: Event (0x2)
  - GenICam node name: Event
- Enum value: TimestampRegister (0x3)
  - GenICam node name: TimestampRegister
- Enum value: FamilyNameRegister (0x4)
  - GenICam node name: FamilyNameRegister
- Enum value: EndiannessRegister (0x5)
  - GenICam node name: EndiannessRegister
- Enum value: WrittenLengthField (0x6)
  - GenICam node name: WrittenLengthField
- Enum value: SBRM (0x7)
  - GenICam node name: SBRM
- Enum value: SIRM (0x8)
  - GenICam node name: SIRM
- Enum value: EIRM (0x9)
  - GenICam node name: EIRM
- Enum value: IIDC2 (0xA)
  - GenICam node name: IIDC2

3.5.1.6 U3vSupportedOption

Description: returns if the selected U3V option is supported.

- Register: U3vSupportedOption[U3vSupportedOptionSelector] (0xFFFFFFFE)
- Field: U3vSupportedOption[U3vSupportedOptionSelector]
- Type: Boolean
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: True

Possible Values:

- Enum value: False (0x0)
  - GenICam node name: False
- Enum value: True (0x1)
  - GenICam node name: True

3.5.2 PayloadSize

Description: provides the number of bytes transferred for each image or chunk on the stream channel. This includes any end-of-line, end-of-frame statistics or other stamp data. This is the total size of data payload for a data block.

- Register: PayloadSize (0x20013400)
- Library: sfnc_usb3
- Field: PayloadSize
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: 1

3.6 UserSetControl

3.6.1 UserSetLoad

Description: loads the User Set specified by UserSetSelector to the device and makes it active.

- Register: UserSetLoad[UserSetSelector] (0x0000)
- Field: UserSetLoad[UserSetSelector]
- Type: Command
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 1

Possible Values:

- 0: Default: UserSetLoadDefault
- 1: UserSet1: UserSetLoadUserSet1

3.6.2 UserSetSave

Description: save the User Set specified by UserSetSelector to the non-volatile memory of the device.

- Register: UserSetSave[UserSetSelector] (0x0000)
- Field: UserSetSave[UserSetSelector]
- Type: Command

- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 1

Possible Values:

- 0: Default:
- 1: UserSet1: UserSetSaveUserSet1

3.6.3 UserSetDefault

Description: Selects the feature User Set to load and make active by default when the device is reset.

- Register: UserSetDefault (0x1A004)
- Field: UserSetDefault
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: Default

Possible Values:

- Enum value: Default (0x0)
  - GenICam node name: Default
- Enum value: UserSet1 (0x1)
  - GenICam node name: UserSet1

3.6.4 UserSetLoadLastUserSet

Description: reports the last user set executed by the device from a user set load command, or as a result of a device reset.

- Register: UserSetLoadLastUserSet (0x1A0A4)
- Field: UserSetLoadLastUserSet
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: Default

Possible Values:

- Enum value: Default (0x0)
  - GenICam node name: Default

- Enum value: UserSet1 (0x1)
    - GenICam node name: UserSet1

3.6.5 UserSetLoadStatus

Description: reports the status of the last user set load executed by the device

- Register: UserSetLoadStatus (0x1A0A0)
- Field: UserSetLoadStatus
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RO
- Disabled: False
- Default: Success

Possible Values:

- Enum value: InProgress (0x1)
    - GenICam node name: InProgress
- Enum value: Failure (0x2)
    - GenICam node name: Failure
- Enum value: Success (0x0)
    - GenICam node name: Success

3.7 PixelBusInterfaceControl

3.7.1 PixelBusDataValidEnabled

Description: controls whether the USB3 engine uses the DVAL signal.

- Register: PixelBusDataValidEnabled[SourceSelector] (0x200134B4)
- Library: adv_features_g2
- Field: PixelBusDataValidEnabled[SourceSelector]
- Type: Boolean
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: False

Possible Values:

- Enum value: False (0x0)
    - GenICam node name: False
- Enum value: True (0x1)
    - GenICam node name: True

3.7.2 PixelBusDataValidPolarity

Description: controls whether the USB3 engine considers the DVAL signal active when DVAL is low or high.

- Register: PixelBusDataValidPolarity[SourceSelector] (0x20013494)
- Field: PixelBusDataValidPolarity[SourceSelector]
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: High

Possible Values:

- Enum value: High (0x0)
  - GenICam node name: High
- Enum value: Low (0x1)
  - GenICam node name: Low

3.7.3 PixelBusLineValidPolarity

Description: controls whether the USB3 engine considers the LVAL signal active when LVAL is low or high.

- Register: PixelBusLineValidPolarity[SourceSelector] (0x20013490)
- Field: PixelBusLineValidPolarity[SourceSelector]
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: High

Possible Values:

- Enum value: High (0x0)
  - GenICam node name: High-
- Enum value: Low (0x1)
  - GenICam node name: Low

3.7.4 PixelBusFrameValidPolarity

Description: controls whether the USB3 engine considers the FVAL signal active when FVAL is low or high.

Register: PixelBusFrameValidPolarity[SourceSelector] (0x2001348C)

- Field: PixelBusFrameValidPolarity[SourceSelector]
- Type: Enum
- LSB: 0

- MSB: 31
- Access: RW
- Disabled: False
- Default: High

Possible Values:

- Enum value: High (0x0)
  - GenICam node name: High
- Enum value: Low (0x1)
  - GenICam node name: Low

3.7.5 PixelLineValidEdgeSensitivity

Description: controls whether the iPORT Engine is sensitive to the edge of LVAL or the level LVAL.

- Register: PixelBusLineValidEdgeSensitivity[SourceSelector] (0x200134A8)
- Field: PixelBusLineValidEdgeSensitivity[SourceSelector]
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: Level

Possible Values:

- Enum value: Level (0x0)
  - GenICam node name: Level
- Enum value: Edge (0x1)
  - GenICam node name: Edge

3.7.6 PixelBusFrameValidEdgeSensitivity

Description: controls whether the iPORT Engine is sensitive to the edge of FVAL or the level FVAL.

- Register: PixelBusFrameValidEdgeSensitivity[SourceSelector] (0x200134A4)
- Field: PixelBusFrameValidEdgeSensitivity[SourceSelector]
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: Level

Possible Values:

- Enum value: Level (0x0)
  - GenICam node name: Level
- Enum value: Edge (0x1)
  - GenICam node name: Edge

3.7.7 PixelBusClockPresent

Description: indicates whether the iPORT Engine detects the presence of the pixel bus clock.

- Register: PixelBusClockPresent[SourceSelector] (0x200134C4)
- Library: adv_features_g2
- Field: PixelBusClockPresent[SourceSelector]
- Type: Boolean
- LSB: 0
- MSB: 0
- Access: RO
- Disabled: False
- Default: False

Possible Values

- Enum value: False (0x0)
  - GenICam node name: False
- Enum value: True (0x1)
  - GenICam node name: True

3.8 NOCTURNFeatures

3.8.1 VideoContrast

Description: sets the video output contrast enhancement of the camera.

- Register: VideoContrast (0x4E058000)
- Field: VideoContrast
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: HistogramStretching

Possible Values:

- Enum value: NoContrast (0x30)
  - GenICam node name: NoContrast
- Enum value: HistogramStretching (0x31)
  - GenICam node name: HistogramStretching
- Enum value: HistogramEqualization (0x32)
  - GenICam node name: HistogramEqualization

- Enum value: LimitedEqualization (0x33)
    - GenICam node name: LimitedEqualization
- Enum value: Automatic (0x3939)
    - GenICam node name: Automatic

3.8.2 VideoContrastHighLimit

Description: histogram stretching high contrast limit. Value expressed as percentage value of cumulative histogram of the scene.

- Register: VideoContrastHighLimit (0x4E058004)
- Field: VideoContrastHighLimit
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 60

3.8.3 VideoContrastLowLimit

Description: histogram stretching low contrast limit. Value expressed as percentage value of cumulative histogram of the scene.

- Register: VideoContrastLowLimit (0x4E058028)
- Field: VideoContrastLowLimit
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.8.4 VideoContrastMinBins

Description: minimum number of bins allowed for remapping histogram when contrast is set to HistogramStrectching.

- Register: VideoContrastMinBins (0x4E05802C)
- Field: VideoContrastMinBins
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.8.5 VideoGamma

Description: video output gamma adjustment for the luminance channel.

- Register: VideoGamma (0x4E058008)
- Field: VideoGamma

- Type: Float
- LSB: 32
- MSB: 63
- Access: RW
- Disabled: False
- Default: 1

3.8.6 SensorGain

Description: adjustment of the sensor gain if the AGC is off.

- Register: SensorGain (0x4E058038)
- Field: SensorGain
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: LowGain

Possible Values:

- Enum value: LowGain (0x31)
  - GenICam node name: LowGain
- Enum value: HighGain (0x37)
  - GenICam node name: HighGain

3.8.7 VideoPolarity

Description: adjustment of the luminance channel video polarity.

- Register: VideoPolarity (0x4E05807C)
- Field: VideoPolarity
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: Normal

Possible Values:

- Enum value: Normal (0x30)
  - GenICam node name: Normal
- Enum value: Inverse (0x31)
  - GenICam node name: Inverse

3.8.8 FrameRate

Description: switches the maximum frame rate of the camera head. This operation causes the camera head to reboot and the camera power should be cycled.

- Register: FrameRate (0x4E0580D0)
- Field: FrameRate
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: FPS60

Possible Values:

- Enum value: FPS60 (0x30)
  - GenICam node name: FPS60
- Enum value: FPS50 (0x32)
  - GenICam node name: FPS50

3.9 NOCTURNAGC

3.9.1 AGC

Description: enables/disable the NOCTURN automatic gain and exposure control.

- Register: AGC (0x4E058030)
- Field: AGC
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: AGCON

Possible Values:

- Enum value: AGCOFF (0x30)
  - GenICam node name: AGCOFF
- Enum value: AGCON (0x31)
  - GenICam node name: AGCON

3.9.2 AGCUpdateInterval

Description: number of histogram before doing AGC update.

- Register: AGCUpdateInterval (0x4E05803C)
- Field: AGCUpdateInterval
- Type: Integer
- LSB: 0

- MSB: 31
- Access: RW
- Disabled: False
- Default: 8

3.9.3 AGCUpLimit

Description: upper limit of cumulative histogram used to adjust AGC exposure and gain. Value is expressed in percentage.

- Register: AGCUpLimit (0x4E058040)
- Field: AGCUpLimit
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 95

3.9.4 AGCUpLimit

Description: number of frames to average for AGC update statistics

- Register: AGCCount (0x4E058044)
- Field: AGCCount
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 32

3.9.5 AGCEVLimit

Description: maximum percentage change in exposure value during AGC update

- Register: AGCEVLim (0x4E058048)
- Field: AGCEVLim
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 20

3.9.6 AGCIntG

Description: maximum reduction in percentage of the sensor exposure when the digital output is saturated.

- Register: AGCIntG (0x4E05804C)
- Field: AGCIntG
- Type: Integer

- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 50

3.9.7 AGCIntGMax

Description: maximum allowed integration time (in lines) value by the AGC algorithm.

- Register: AGCIntGMax (0x4E058050)
- Field: AGCIntGMax
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 2

3.9.8 ROILeft

Description: left coordinate of the histogram region of interest used by the AGC and contrast enhancement. Coordinate is measured from the left of the image plane.

- Register: ROILeft (0x4E0580BC)
- Field: ROILeft
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 10

3.9.9 ROITop

Description: top coordinate of the histogram region of interest used by the AGC and contrast enhancement. Coordinate is measured from the top of the image plane.

- Register: ROITop (0x4E0580B8)
- Field: ROITop
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 256

3.9.10 ROIBottom

Description: bottom coordinate of the histogram region of interest used by the AGC and contrast enhancement. Coordinate is measured from the bottom of the image plane.

- Register: ROIBottom (0x4E0580B4)

- Field: ROIBottom
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 256

3.9.11 ROIRight

Description: bottom coordinate of the histogram region of interest used by the AGC and contrast enhancement. Coordinate is measured from the bottom of the image plane.

- Register: ROIRight (0x4E0580C0)
- Field: ROIRight
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 10

3.9.12 ROIAutoScale

Description: auto-scale the histogram region of interest used by the AGC and contrast enhancement with digital zoom factor.

- Register: ROIAutoScale (0x4E0580F0)
- Field: ROIAutoScale
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: On

Possible Values:

- Enum value: Off (0x30)
  - GenICam node name: Off
- Enum value: On (0x31)
  - GenICam node name: On

3.10 NOCTURNFilters

3.10.1 MedianFilter

Description: enables/disable the NOCTURN median filter.

- Register: MedianFilter (0x4E058074)
- Field: MedianFilter

- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: FilterOff

Possible Values:

- Enum value: FilterOff (0x30), filter is off
  - GenICam node name: FilterOff
- Enum value: FilterOn (0x31), filter is on
  - GenICam node name: FilterOn
- Enum value: FilterAuto (0x32), filter is turned on automatically at low light if AGC is enabled.
  - GenICam node name: FilterAuto

3.10.2 ConvolutionFilter

Description: enables/disable the NOCTURN convolution filter.

- Register: ConvolutionFilter (0x4E058078)
- Field: ConvolutionFilter
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: FilterOff

Possible Values:

- Enum value: FilterOff (0x30), filter is off
  - GenICam node name: FilterOff
- Enum value: FilterOn (0x31), filter is on
  - GenICam node name: FilterOn
- Enum value: FilterAuto (0x32), filter is turned on automatically at high light if AGC is enabled.
  - GenICam node name: FilterAuto

3.10.3 ConvolutionFilterName

Description: select convolution filter to use when ConvolutionFilter is enabled.

- Register: ConvolutionFilterName (0x4E058020)
- Field: ConvolutionFilterName
- Type: Enum
- LSB: 0

- MSB: 31
- Access: RW
- Disabled: False
- Default: SharpFilter

Possible Values:

- Enum value: SharpFilter (0x30), simple sharpening filter
  - GenICam node name: SharpFilter
- Enum value: StrongSharpFilter (0x31), detail filter
  - GenICam node name: StrongSharpFilter
- Enum value: LaplacianFilter (0x32), Laplacian filter
  - GenICam node name: LaplacianFilter

3.11 NOCTURNAdvancedFeatures

3.11.1 TemperatureRead

Description: enables temperature read back from the sensor head.

- Register: TemperatureRead (0x4E058054)
- Field: TemperatureRead
- Type: Boolean
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: False

Possible Values:

- Enum value: False (0x0)
  - GenICam node name: False
- Enum value: True (0x1)
  - GenICam node name: True

3.11.2 SensorTemperature

Description: calculated sensor temperature in degrees Celsius.

- Register: SensorTemperature (0x4E05805C)
- Field: SensorTemperature
- Type: Float
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0.0

3.11.3 FPGATemperature

Description: read the camera head FPGA board temperature.

- Register: FPGATemperature (0x4E0580AC)
- Field: FPGATemperature
- Type: Float
- LSB: 32
- MSB: 63
- Access: RO
- Disabled: False
- Default: 0.0

3.11.4 DigitalZoom

Description: sets the digital zoom level of the camera head.

- Register: DigitalZoom (0x4E058060)
- Field: DigitalZoom
- Type: Float
- LSB: 32
- MSB: 63
- Access: RW
- Disabled: False
- Default: 1.00000

3.11.5 DigitalZoomPanX

Description: pan on the horizontal axis from the image center when DigitalZoom is enabled.

- Register: DigitalZoomPanX (0x4E058068)
- Field: DigitalZoomPanX
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.11.6 DigitalZoomPanY

Description: pan on the verticall axis from the image center when DigitalZoom is enabled.

- Register: DigitalZoomPanY (0x4E05806C)
- Field: DigitalZoomPanY
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.11.7 NOCTURNSaveDefault

Description: save the NOCTURN camera head settings as power on defaults.

- Register: NOCTURNSaveDefault (0x4E058070)
- Field: NOCTURNSaveDefault
- Type: Command
- LSB: 0
- MSB: 31
- Access: WO
- Disabled: False
- Default: 0

3.12 NOCTURNColor

3.12.1 ColorSaturation

Description: adjusts the CbCr or UV gain for the color.

- Register: ColorSaturation (0x4E058080)
- Field: ColorSaturation
- Type: Float
- LSB: 32
- MSB: 63
- Access: RW
- Disabled: False
- Default: 1

3.12.2 BlueGain

Description: adjusts the blue gain for the color if the ColorAutoGain is disabled and WBalSetting is set to manual.

- Register: BlueGain (0x4E058088)
- Field: BlueGain
- Type: Float
- LSB: 32
- MSB: 63
- Access: RW
- Disabled: False
- Default: 4.0

3.12.3 GreenGain

Description: adjusts the green gain for the color if the ColorAutoGain is disabled and WBalSetting is set to manual.

- Register: GreenGain (0x4E058090)
- Field: GreenGain
- Type: Float
- LSB: 32

- MSB: 63
- Access: RW
- Disabled: False
- Default: 4.0

3.12.4 RedGain

Description: adjusts the red gain for the color if the ColorAutoGain is disabled and WBalSetting is set to manual.

- Register: RedGain (0x4E058098)
- Field: RedGain
- Type: Float
- LSB: 32
- MSB: 63
- Access: RW
- Disabled: False
- Default: 4.0

3.12.5 ColorGain

Description: Additional color gain that can be applied for low light conditions. This option is only available with the ColorAutoGain is disabled.

- Register: ColorGain (0x4E0580C4)
- Field: ColorGain
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 1

3.12.6 ColorAutoGain

Description: enables the auto adjustment of the color gain to maintain pre-selected color balance with light level.

- Register: ColorAutoGain (0x4E0580C8)
- Field: ColorAutoGain
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: On

Possible Values:

- Enum value: Off (0x30)
    - GenICam node name: Off

- Enum value: On (0x31)
    - GenICam node name: On

3.12.7 ColorMode

Description: when in output is set to color this allow to switch between mono and color imagery.

- Register: ColorMode (0x4E0580CC)
- Field: ColorMode
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: Automatic

Possible Values:

- Enum value: Monochrome (0x30)
    - GenICam node name: Monochrome
- Enum value: Color (0x31)
    - GenICam node name: Color
- Enum value: Automatic (0x32), automatically switches between monochrome and color depending on the light level.
    - GenICam node name: Automatic

3.12.8 ColorAutoGainOff

Description: threshold in number of histogram bin number to turn off the color and switch the output to monochrome if ColorMode is set to Automatic.

- Register: ColorAutoGainOff (0x4E0580F8)
- Field: ColorAutoGainOff
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 125

3.12.9 ColorAutoGainOn

Description: threshold in number of histogram bin number to turn off the monochrome and switch the output to color if ColorMode is set to Automatic.

- Register: ColorAutoGainOn (0x4E0580F4)
- Field: ColorAutoGainOn
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW

- Disabled: False
- Default: 150

3.12.10 WBalSetting

Description: adjusts the white balance setting of the camera between ranges of pre-sets.

- Register: WBalSetting (0x4E0580D4)
- Field: WBalSetting
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: Manual

Possible Values:

- Enum value: Manual (0x0), enables the Blue, Green and Red gain adjustments
  - GenICam node name: Manual
- Enum value: SunnyDay (0x1) without IR cut-filter
  - GenICam node name: SunnyDay
- Enum value: SunnyDayIR (0x2) with IR cut filter
  - GenICam node name: SunnyDayIR
- Enum value: OvercastDay (0x3) without IR cut-filter
  - GenICam node name: OvercastDay
- Enum value: OvercastDayIR (0x4) with IR cut-filter
  - GenICam node name: OvercastDayIR
- Enum value: Tungsten (0x5) without IR cut-filter
  - GenICam node name: Tungsten
- Enum value: TungstenIR (0x6) with IR cut-filter
  - GenICam node name: TungstenIR
- Enum value: Fluorescent (0x7) without IR cut-filter
  - GenICam node name: Fluorescent
- Enum value: FluorescentIR (0x8) with IR cut-filter
  - GenICam node name: FluorescentIR
- Enum value: FullMoon (0x9) with IR cut-filter
  - GenICam node name: FullMoon
- Enum value: FullMoonIR (0xA) with IR cut-filter
  - GenICam node name: FullMoonIR

3.12.11 OutputMode

Description: switches the signal output of the camera between monochrome and color (YCbCr or YUV).

- Register: OutputMode (0x4E0580D8)
- Field: OutputMode
- Type: Enum

- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: YCbCr

Possible Values:

- Enum value: Mono8 (0x31)
  - GenICam node name: Mono8
- Enum value: Mono10 (0x32)
  - GenICam node name: Mono10
- Enum value: YCbCr (0x33)
  - GenICam node name: YCbCr
- Enum value: YUV (0x34)
  - GenICam node name: YUV

3.12.12 MonoROI

Description: enables or disables monochrome window of interest in color image.

- Register: MonoROI (0x4E0580DC)
- Field: MonoROI
- Type: Enum
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: Off

Possible Values:

- Enum value: Off (0x30)
  - GenICam node name: Off
- Enum value: On (0x31)
  - GenICam node name: On

3.12.13 MonoROITop

Description: top coordinate in pixel of the monochrome window of interest in color image.

- Register: MonoROITop (0x4E0580E0)
- Field: MonoROITop
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False

- Default: 0

3.12.14 MonoROILeft

Description: left coordinate in pixel of the monochrome window of interest in color image.

- Register: MonoROILeft (0x4E0580E4)
- Field: MonoROILeft
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 0

3.12.15 MonoROIHeight

Description: height in pixel of the monochrome window of interest in color image.

- Register: MonoROIHeight (0x4E0580E8)
- Field: MonoROIHeight
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 1023

3.12.16 MonoROIWidth

Description: width in pixel of the monochrome window of interest in color image.

- Register: MonoROIWidth (0x4E0580EC)
- Field: MonoROIWidth
- Type: Integer
- LSB: 0
- MSB: 31
- Access: RW
- Disabled: False
- Default: 640

4 Serial Communication

Additional NOCTURN specific functions can also be access through either the serial port on the power and expansion IO connector or through the USB3 engine serial interface bridge for integrator. Please contact PHOTONIS technical support if specific functions are required through the serial interface for your application.